SENCORE MODEL RC121K

"SUBSTITUTOR" KIT

ASSEMBLY AND WIRING INSTRUCTIONS FOR RC121K

MECHANICAL ASSEMBLY

After the kit introduction booklet has been thoroughly read, you will now be ready to start assembly of your kit. It is a good idea to check each component against the parts list manual so you can familiarize yourself with them.

Figure #1 is a rear view of the panel and the layout of the various components. These parts can be mounted as follows:

1. There are four banks of MARKED power resistors ranging from 15 to 15,000 ohms (see Fig. 1). Before mounting, cut all leads to ½" in length, from body. Place a 4⅝" x ¾" strip of black fishpaper between each resistor before mounting. If resistors are awkward to handle, they may be held together with a couple of rubber bands until mounted. Bend the 4⅝" x 1-11/16" fishpaper ¼" right angle at one end so fishpaper will fit between top lip of panel and power resistors. Place paper between panel, lip and power resistors. Place the 1-15/16" lg. rubber channel between the power resistors and "Z" shaped bracket. Tighten bracket to panel by means of the phillips head 6-32 bolt, washer and hex nut. For best results, insert the bracket between terminals 3 and 4. Observe *the dimensions in Fig. 1* between terminals 1 and 2 and 5 and 6 and mount your resistors accordingly.
2. Electrolytic rotary switch, part #25G54
3. Capacitor and rectifier rotary switch, part #25G53
4. Power resistor rotary switch, part #25G52
5. Carbon resistor rotary switch, part #25G51

The switches have the part number stamped on them. If you will note, there are four small holes directly above the ⅜" holes in the center of the panel. The key tabs on each switch should be inserted into these small holes. The tab can be recognized as a small flat piece of metal protruding forward toward the shaft. Insert the threaded bushing of the switch through the ⅜" hole and *line up the key tab on the switch with the small hole directly above the bushing.* Tighten switch with washer and ⅜" hex nut. The rear of these switches should now appear the same as shown in Fig. #1.

6. There are seven red and two black tip jacks (see Fig. #1). Place a tip jack through one of the holes on the bottom of the panel. Lay the bottom of the panel on the table so the jack is held firmly between the table and the panel. Care should be taken so that only the jacks rest on the table and not the slide switches or the panel may "rock". Insert one star washer (convex type) over each of the jacks and work it down with a screwdriver until the jack is firmly secured.

No mention has been made of the slide switches since they are premounted for you. Do *not* remove the spring that connects to the surge protector switch as it has been correctly oriented for you. After rechecking your panel assembly, you will now be ready for wiring.

ELECTRICAL WIRING

All wires are precut and stripped for you so observe lead length given in text of each figure. If no wire color is indicated on a particular drawing, this indicates a bare wire.

CARBON RESISTOR BANK

The carbon resistors are to be made into a circular bank with all the one watt resistors (larger) toward the center and the one half watt resistors (smaller) in between the 1 watt and farther away from the center. All the resistors are to be mounted vertical to the panel with one end connected to a circular copper bus and the other ends to switch S1. (See Fig. 2).

TO MAKE CARBON RESISTOR BANK:

1. Fig. #3 is a template of the circular bank with the correct spacing and appropriate values. For best results, cut Fig. 3 out of this book and glue it to a piece of cardboard. Then take a small nail or thumbtack and punch a hole in the center of each dot through the cardboard.

2. The one watt carbon resistors should have their leads cut approximately ½" from each end of the body and the ½ watt resistors (smaller) should be cut with ½" on one end (to bus) and ¾" on the other (to S1), both dimensions being from body.

3. Insert the resistors through the cardboard observing the correct resistance as printed on the template. Either end of the one watt can be placed through the cardboard but care should be taken to insert the ¾" end of the one-half watt through it. A device like a coffee cup can be used to hold the cardboard while placing the resistors through it.

4. The #18 ga. copper ring is the common resistor bus. With the resistors still inserted in the cardboard connect the ½" end of each resistor to the bus maintaining a fairly equal spacing. It may be found easier to pick 4 resistors 90° apart from each other and connect and solder them first to prevent the bus from wobbling.

5. Remove the resistors from the cardboard after connecting them to the bus, and connect them to switch S1 (See Fig. 4). Wire up slide switch and jacks as shown in Fig. 4.

SOLDERING PHONE TIPS TO TEST LEADS

To solder the phone tips to the test leads the following procedure should be followed.

1. Insert the phone tips into a small vice or cardboard so the tip is vertical with the open end pointing up.
2. Heat the tip and apply solder in the open end.
3. With the soldering iron still applied to the tip insert one end of the test lead into the tip.
4. Remove the soldering iron from the tip after a few seconds and allow the solder to cool. Be careful to hold the lead steady while the solder is cooling or a cold solder joint may occur.
5. Connect and solder the other end of the test lead to an alligator clip. Place corresponding colored plastic insulator over alligator clip.

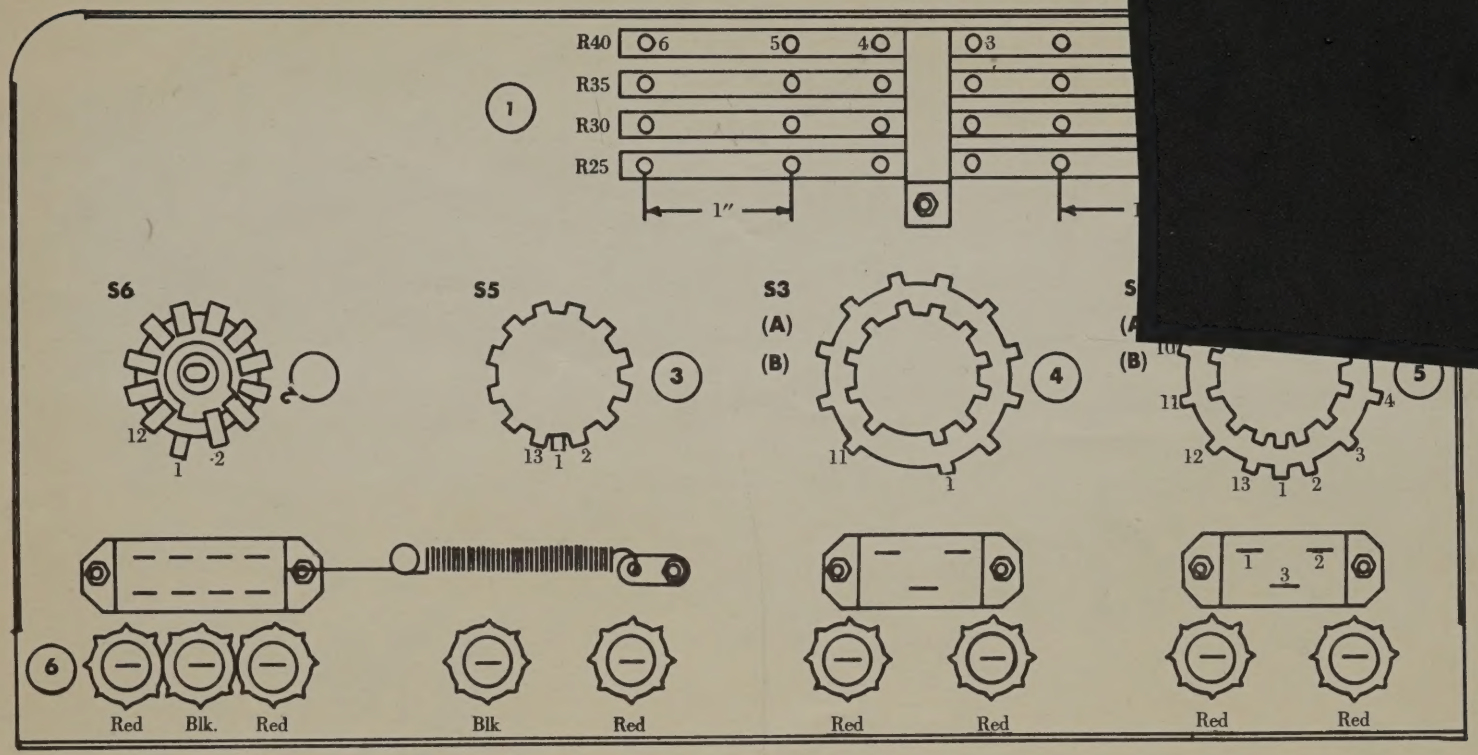


Fig. 1 ASSEMBLY OF PARTS TO FRONT PANEL

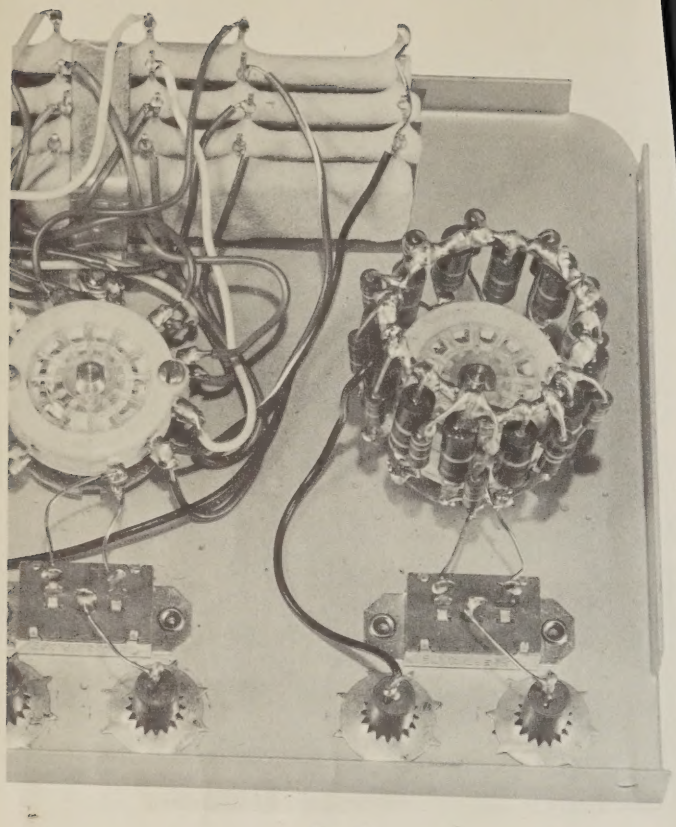


Fig. 2

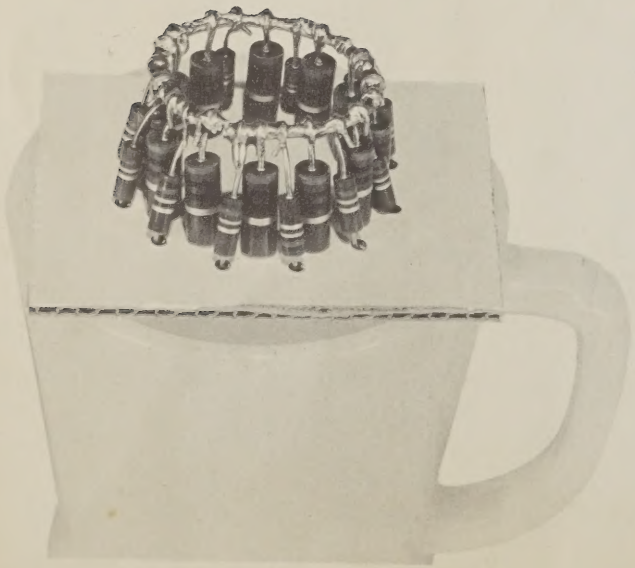
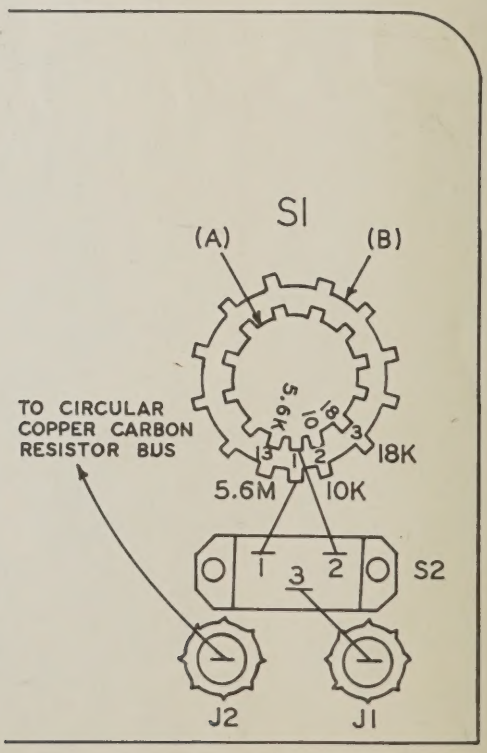


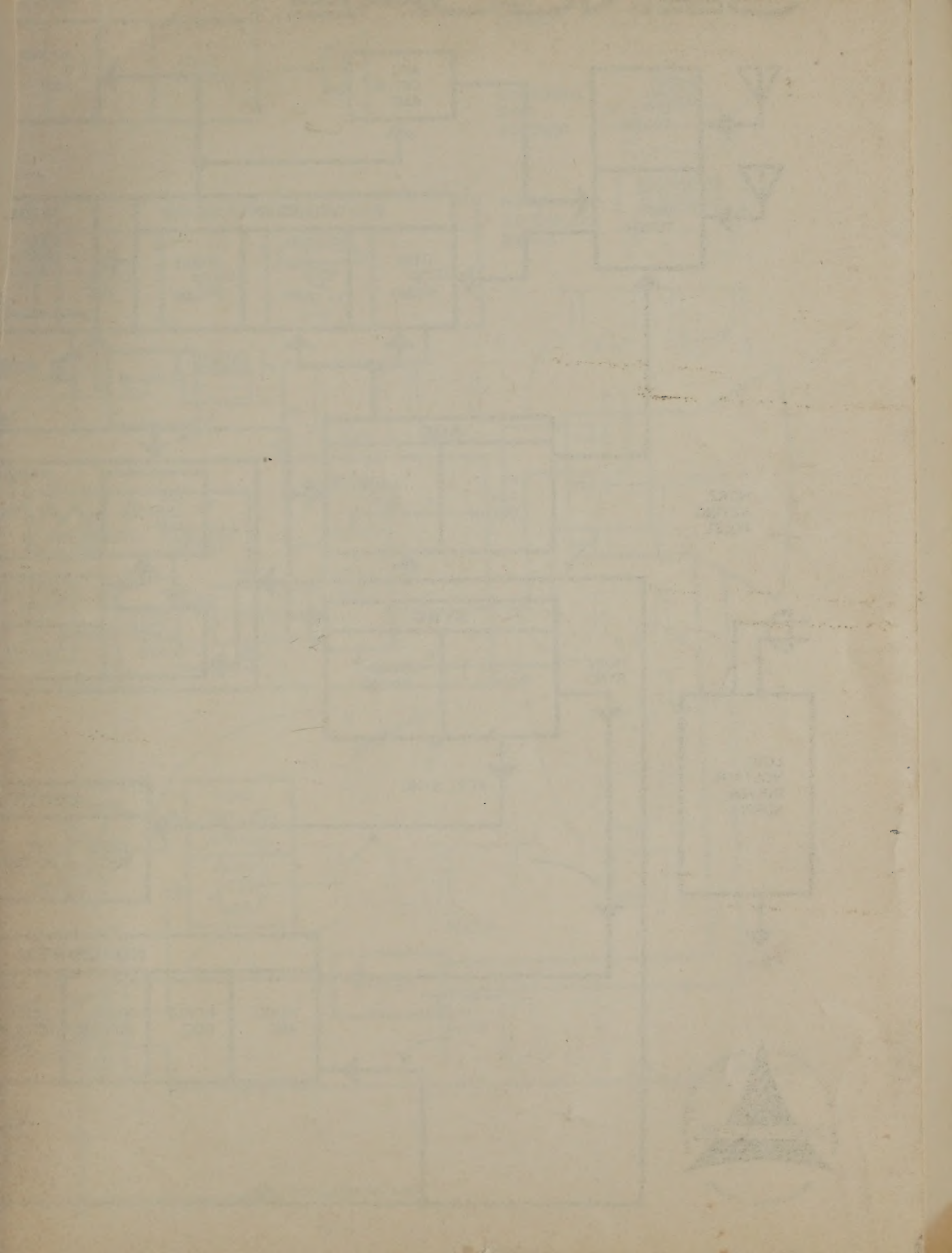
Fig. 4

FIG. 3
TEMPLATE FOR MAKING CARBON BANK RESISTORS

FIG. 4
Wiring of Carbon Resistor Section



REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
	1⅛″ lg bare wire	S1B-1	S2-1	S1B-1, S2-1
	1⅛″ lg bare wire	S1A-1	S2-2	S1A-1, S2-2
	1⅛″ lg bare wire	S2-3	J1	S2-3, J1
	3½″ lg blk wire	J2	Copper Carbon Res. Bus (15 ga wire loop)	J2, Bus



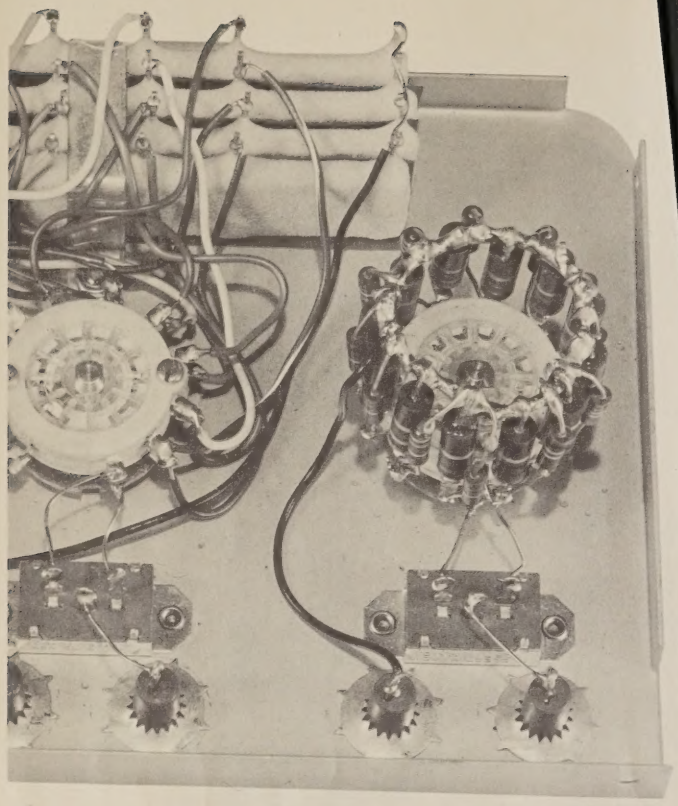


Fig. 2

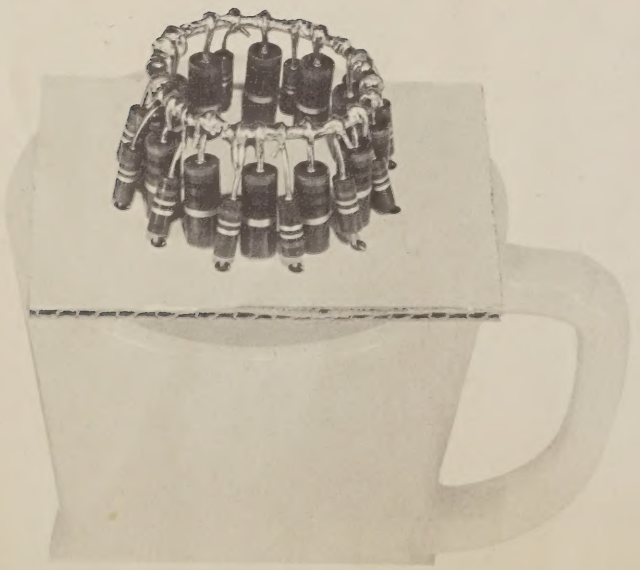


Fig. 4

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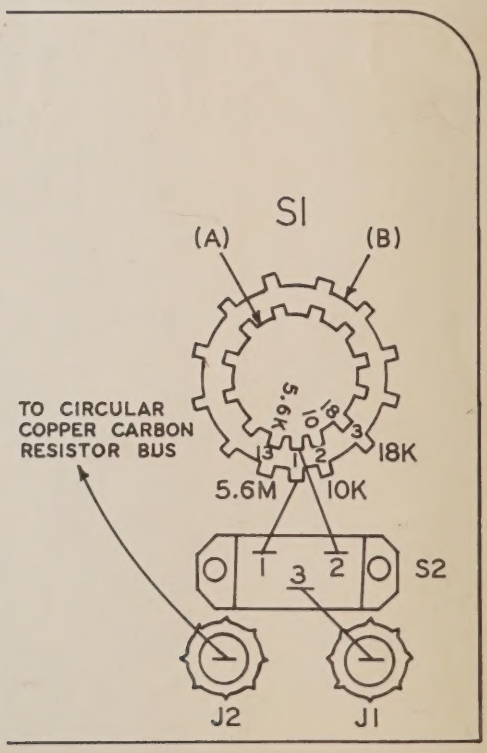
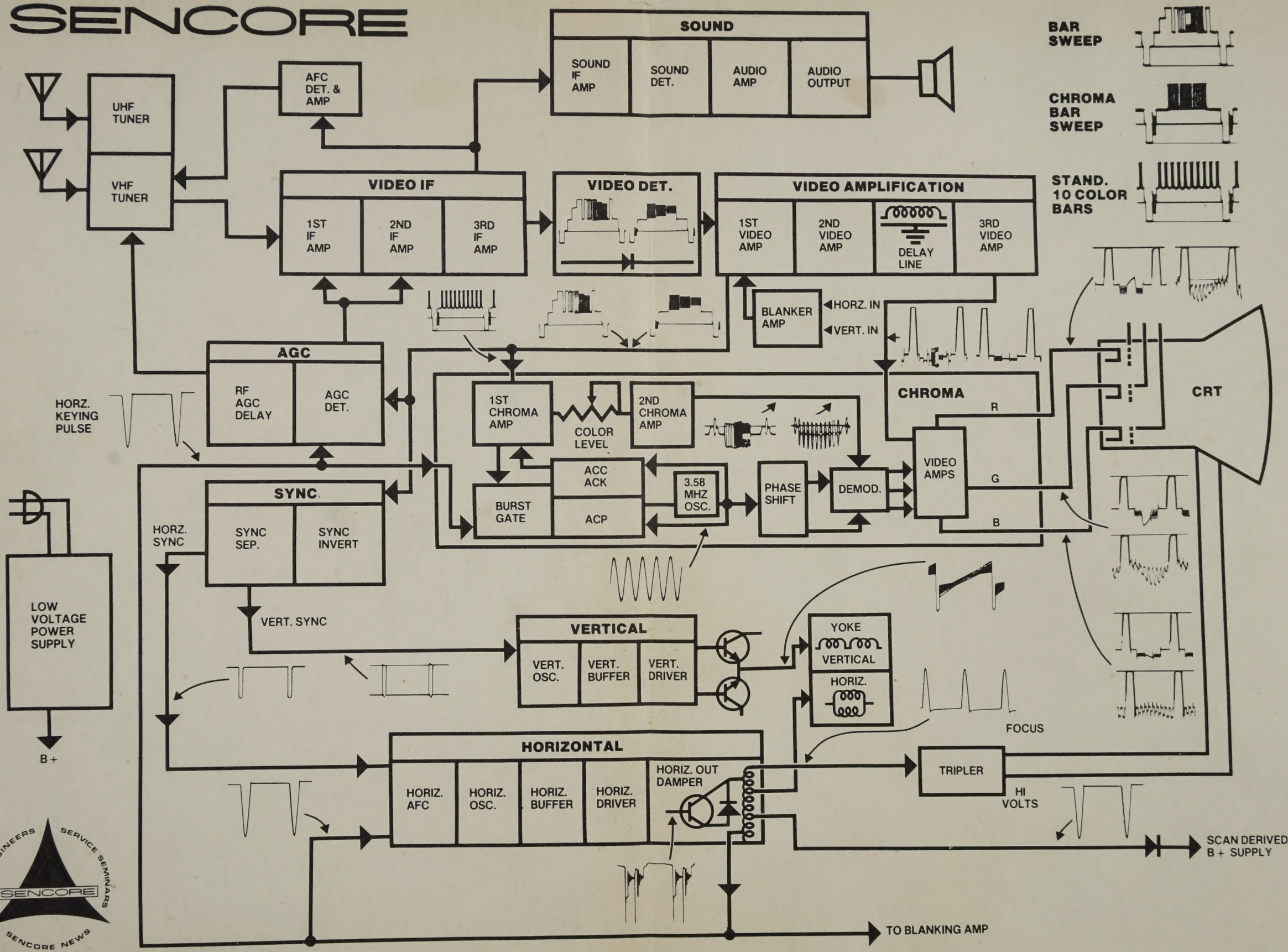


REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
	1⅛" lg bare wire	S1B-1	S2-1	S1B-1, S2-1
	1⅛" lg bare wire	S1A-1	S2-2	S1A-1, S2-2
	1⅛" lg bare wire	S2-3	J1	S2-3, J1
	3½" lg blk wire	J2	Copper Carbon Res. Bus (15 ga wire loop)	J2, Bus

SENCORE



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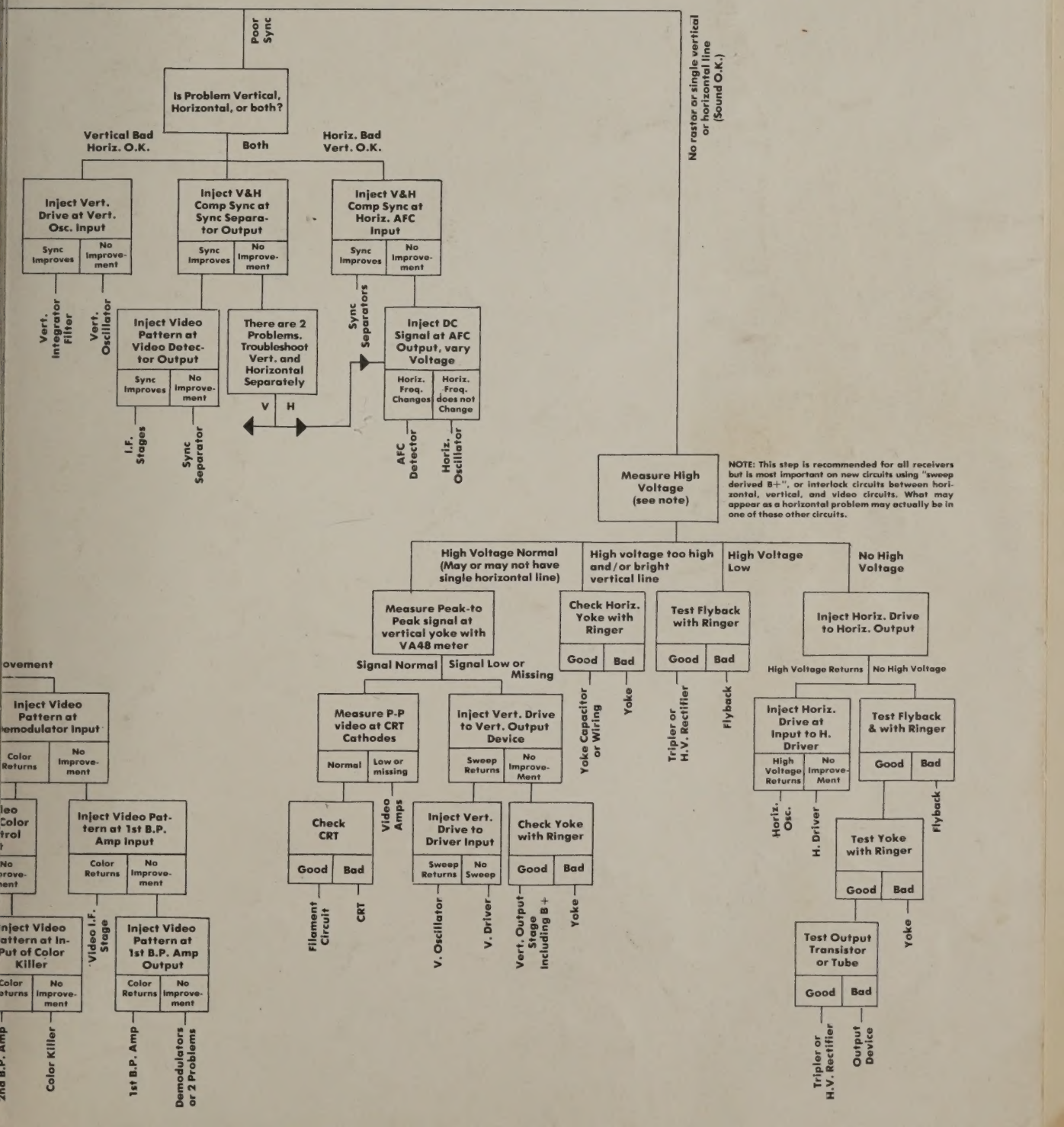
Troubleshooting Guide

Use this guide as a "roadmap" to keep your color TV troubleshooting on track and maintain peak efficiency.

Functional Analyzing Steps

1. **Determine overall symptoms by injecting VA48 signal into antenna and noting what does and what does not work properly.**
2. **Inject substitute signal at detector or main division point.**
3. **Continue to divide stages with signal injection until one stage is isolated.**
4. **Troubleshoot isolated stage with DC voltages, scope waveforms, and/or component tests.**



VA48 Functional Analyzing Troubleshooting Guide

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Defective Receiver

Inject VA48 Signals to Antenna Input and Note Symptoms

Poor Audio

Inject 1000 Hz Audio at Audio Detector Output

- No Improvement
  - **Inject 1000 Hz Audio at Volume Control** — Audio Improves / No Improvement
    - Preamp
    - **Inject 1000 Hz at Amplifier Output** — Audio Improves / No Improvement
      - Audio Amp
      - Speaker
- Sound Improves
  - **Inject 4.5 MHz Sound IF Signal at Sound Takeoff** — Audio Improves / No Improvement
    - Video IF
    - **Inject 4.5 MHz Sound IF Signal at Sound Detector Input** — Audio Improves / No Improvement
      - Sound IF
      - Sound Detector

Poor Video

Inject Video Pattern at Video Detector Output

- Video Improves
  - **Inject Tuner Sub Signal at I.F. Input** — Video Improves / No Improvement
    - **Inject VHF Channel on each Tuner Channel** — Some Channels Dead / All Channels Dead
      - Snow
        - Fine Tuning
        - Channel Switch
        - RF Amp
        - Mixer
      - No Snow
    - **Inject 3rd IF signal at 3rd IF Input** — Video Improves / No Improvement
      - **Inject 2nd IF Signal at 2nd IF Input** — Video Improves / No Improvement
        - 1st IF
        - 2nd IF
      - **Inject 3rd IF Signal at Video Detector Input (Full Level)** — Video Improves / No Improvement
        - 3rd IF
        - Video Det.
- No Improvement
  - **Inject Video Pattern at Delay Line Input** — Video Improves / No Improvement
    - **Inject Video Pattern at 2nd Video Amp Input** — Video Improves / No Improvement
      - 1st Video
      - 2nd Video
    - **Inject Video Pattern at Video Output Stage** — Video Improves / No Improvement
      - **Inject Video Pattern at Input of 3rd Video Amp* (Video Driver)** — Video Improves / No Improvement
        - Delay Line
        - 3rd Video Amp
      - **Test CRT** — CRT Good / CRT Bad
        - Video Out
        - CRT

Wrong Color

What is wrong with Colors?

- Poor Tint Range
  - **Inject 3.58 MHz at Tint Circuit Input** — Color Improves / No Improvement
    - Color APC Circuit
    - **Check CRT** — Good / Bad
      - CRT
      - **Check B.P. Amp Alignment** — Good / Bad
        - Demodulators
        - Align B.P. Amps
- Color Missing
  - **Inject video pattern at input of affected color output amplifier** — Color Returns / No Improvement
    - Demodulators
    - **Check CRT** — Good / Bad
      - Output Amp
      - CRT

No Color

Inject 3.58 MHz XTAL OSC Signal at Demodulator Input

- Color Returns
  - **Inject 3.58 MHz at 3.58 MHz Oscillator Output** — Color Returns / No Improvement
    - **Inject 3.58 MHz at Burst Gate Output** — Color Returns / No Improvement
      - **Inject Keying Pulse at Burst Gate Input** — Color Returns / No Improvement
        - Flyback & Wiring
        - Burst Gate
      - **Inject DC Voltage at APC Output** — Color Returns / No Improvement
        - Phase Detector
        - 3.58 Oscillator
    - **Inject 3.58 at 3.58 Driver Output *** — Color Returns / No Improvement
      - 3.58 Driver
      - Tint Phase Network
  - **Inject Video Pattern at Demodulator Input** — Color Returns / No Improvement
    - **Inject Video Pattern at Color Level Control Output** — Color Improves / No Improvement
      - **Inject Video Pattern at Input of Color Level Control** — Color Returns / No Improvement
        - 1st B.P. Amp
        - Color Level Control
      - **Inject Video Pattern at Input of Color Killer** — Color Returns / No Improvement
        - 2nd B.P. Amp
        - Color Killer
    - **Inject Video Pattern at 1st B.P. Amp Input** — Color Returns / No Improvement
      - Video I.F. Stage
      - **Inject Video Pattern at 1st B.P. Amp Output** — Color Returns / No Improvement
        - 1st B.P. Amp
        - Demodulators or 2 Problems

* Not found in all receivers.

Poor Sync

Is Problem Vertical, Horizontal, or both?

- Vertical Bad, Horiz. O.K.
  - **Inject Vert. Drive at Vert. Osc. Input** — Sync Improves / No Improvement
    - Vert. Integrator Filter
    - Vert. Oscillator
- Both
  - **Inject V&H Comp Sync at Sync Separator Output** — Sync Improves / No Improvement
    - **Inject Video Pattern at Video Detector Output** — Sync Improves / No Improvement
      - I.F. Stages
      - Sync Separator
    - **There are 2 Problems. Troubleshoot Vert. and Horizontal Separately**
      - V
      - H
- Horiz. Bad, Vert. O.K.
  - **Inject V&H Comp Sync at Horiz. AFC Input** — Sync Improves / No Improvement
    - Sync Separators
    - **Inject DC Signal at AFC Output, vary Voltage** — Horiz. Freq. Changes / Horiz. Freq. does not Change
      - AFC Detector
      - Horiz. Oscillator

No rastor or single vertical or horizontal line (Sound O.K.)

Measure High Voltage (see note)

NOTE: This step is recommended for all receivers but is most important on new circuits using "sweep derived B+", or interlock circuits between horizontal, vertical, and video circuits. What may appear as a horizontal problem may actually be in one of these other circuits.

- High Voltage Normal (May or may not have single horizontal line)
  - **Measure Peak-to Peak signal at vertical yoke with VA48 meter** — Signal Normal / Signal Low or Missing
    - **Measure P-P video at CRT Cathodes** — Normal / Low or missing
      - **Check CRT** — Good / Bad
        - Filament Circuit
        - CRT
      - Video Amps
    - **Inject Vert. Drive to Vert. Output Device** — Sweep Returns / No Improvement
      - **Inject Vert. Drive to Driver Input** — Sweep Returns / No Sweep
        - V. Oscillator
        - V. Driver
      - **Check Yoke with Ringer** — Good / Bad
        - Vert. Output Stage Including B+
        - Yoke
    - Yoke Capacitor or Wiring
    - Yoke
- High voltage too high and/or bright vertical line
  - **Check Horiz. Yoke with Ringer** — Good / Bad
    - Yoke Capacitor or Wiring
    - Yoke
- High Voltage Low
  - **Test Flyback with Ringer** — Good / Bad
    - Tripler or H.V. Rectifier
    - Flyback
- No High Voltage
  - **Inject Horiz. Drive to Horiz. Output** — High Voltage Returns / No High Voltage
    - **Inject Horiz. Drive at Input to H. Driver** — High Voltage Returns / No Improvement
      - Horiz. Osc.
      - H. Driver
    - **Test Flyback & with Ringer** — Good / Bad
      - Flyback
      - **Test Yoke with Ringer** — Good / Bad
        - Yoke
        - **Test Output Transistor or Tube** — Good / Bad
          - Tripler or H.V. Rectifier
          - Output Device

Form 2000

VA48 Functional Analyzir

Defective Rec

Inject VA48 Si
to Antenna I
and Note Sym

Poor Audio

Inject 1000 Hz Audio at Audio Detector Output

No Improvement | Sound Improves

Inject 1000 Hz Audio at Volume Control

Audio Improves | No Improvement

Preamp

Inject 1000 Hz at Amplifier Output

Audio Improves | No Improvement

Audio Amp | Speaker

Inject 4.5 MHz Sound IF Signal at Sound Takeoff

Audio Improves | No Improvement

Video IF

Inject 4.5 MHz Sound IF Signal at Sound Detector Input

Audio Improves | No Improvement

Sound IF | Sound Detector

Poor Video

Inject Video Pattern at Video Detector Output

Video Improves | No Improvement

Inject Tuner Sub Signal at I.F. Input

Video Improves | No Improvement

Inject VHF Channel on each Tuner Channel

Some Channels Dead | All Channels Dead

Snow | No Snow

Fine Tuning | Channel Switch | RF Amp | Mixer

Inject 3rd IF signal at 3rd IF Input

Video Improves | No Improvement

Inject 2nd IF Signal at 2nd IF Input

Video Improves | No Improvement

1st IF | 2nd IF

Inject 3rd IF Signal at Video Detector Input (Full Level)

Video Improves | No Improvement

3rd IF | Video Det.

Inject Video Pattern at Delay Line Input

Video Improves | No Improvement

Inject Video Pattern at 2nd Video Amp Input

Video Improves | No Improvement

1st Video | 2nd Video

Inject Video Pattern at Video Output Stage

Video Improves | No Improvement

Inject Video Pattern at Input of 3rd Video Amp* (Video Driver)

Video Improves | No Improvement

Delay Line | 3rd Video Amp

Test CRT

CRT Good | CRT Bad

Video Out. | CRT

Wrong Color

What is wrong with Colors?

Poor Tint Range | Color Missing

Inject 3.58 MHz at Tint Circuit Input

Color Improves | No Improvement

Color APC Circuit

Check CRT

Good | Bad

CRT

Check B.P. Amp Alignment

Good | Bad

Demodulators | Align B.P. Amps

Inject video pattern at input of affected color output amplifier

Color Returns | No Improvement

Demodulators

Check CRT

Good | Bad

Output Amp | CRT

No Color

Inject 3.58 MHz XTAL OSC Signal at Demodulator Input

Color Returns | No

Inject 3.58 MHz at 3.58 MHz Oscillator Output

Color Returns | No Improvement

Inject 3.58 MHz at Burst Gate Output

Color Returns | No Improvement

Inject Keying Pulse at Burst Gate Input

Color Returns | No Improvement

Flyback & Wiring | Burst Gate

Inject DC Voltage at APC Output

Color Returns | No Improvement

Phase Detector | 3.58 Oscillator

Inject 3.58 at 3.58 Driver Output *

Color Returns | No Improvement

3.58 Driver | Tint Phase Network

Inje
Patte
Leve
O

Color Improve

Inject Video Pattern at In- put of Color Level Control

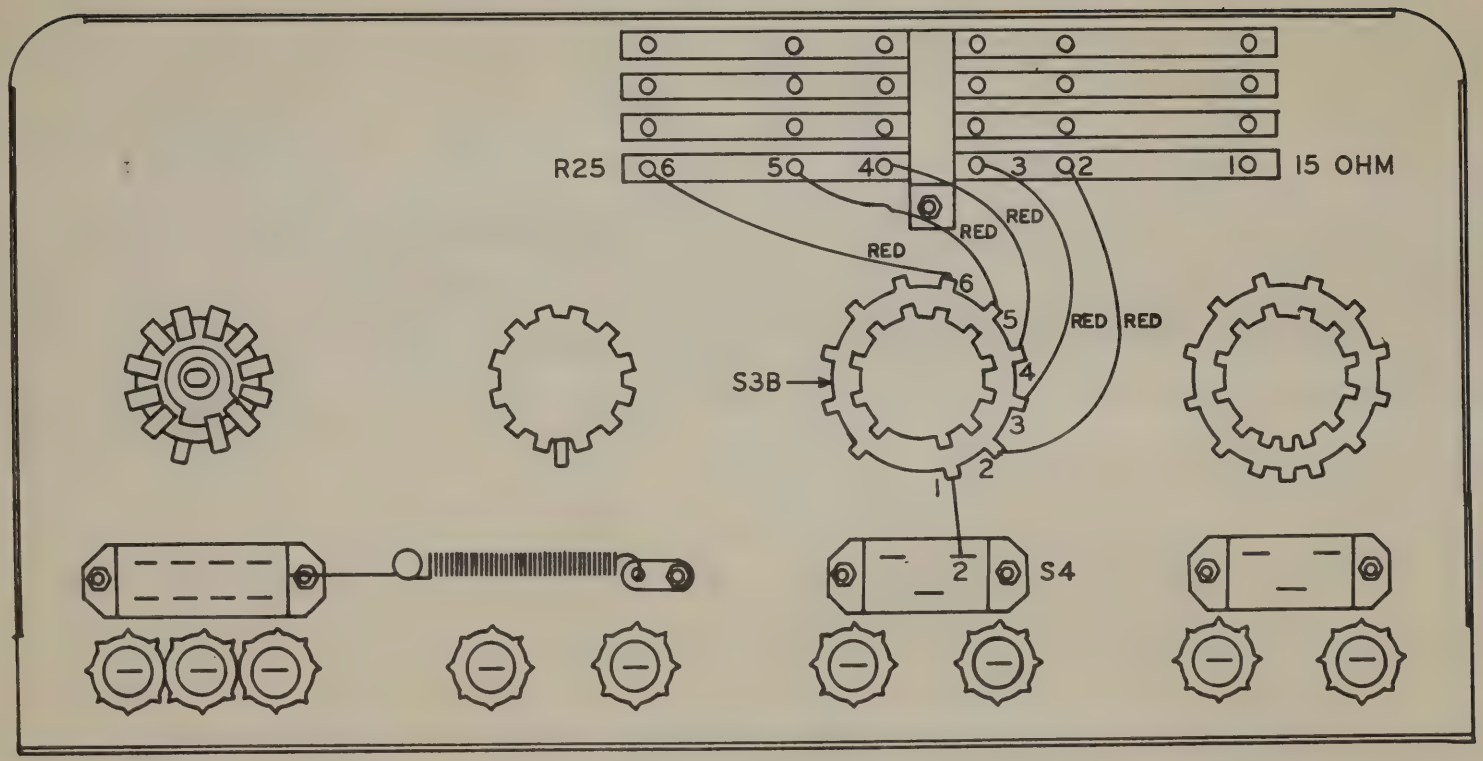
Color Returns | No Improv ment

1st B.P. Amp | Color Level

Form 2000

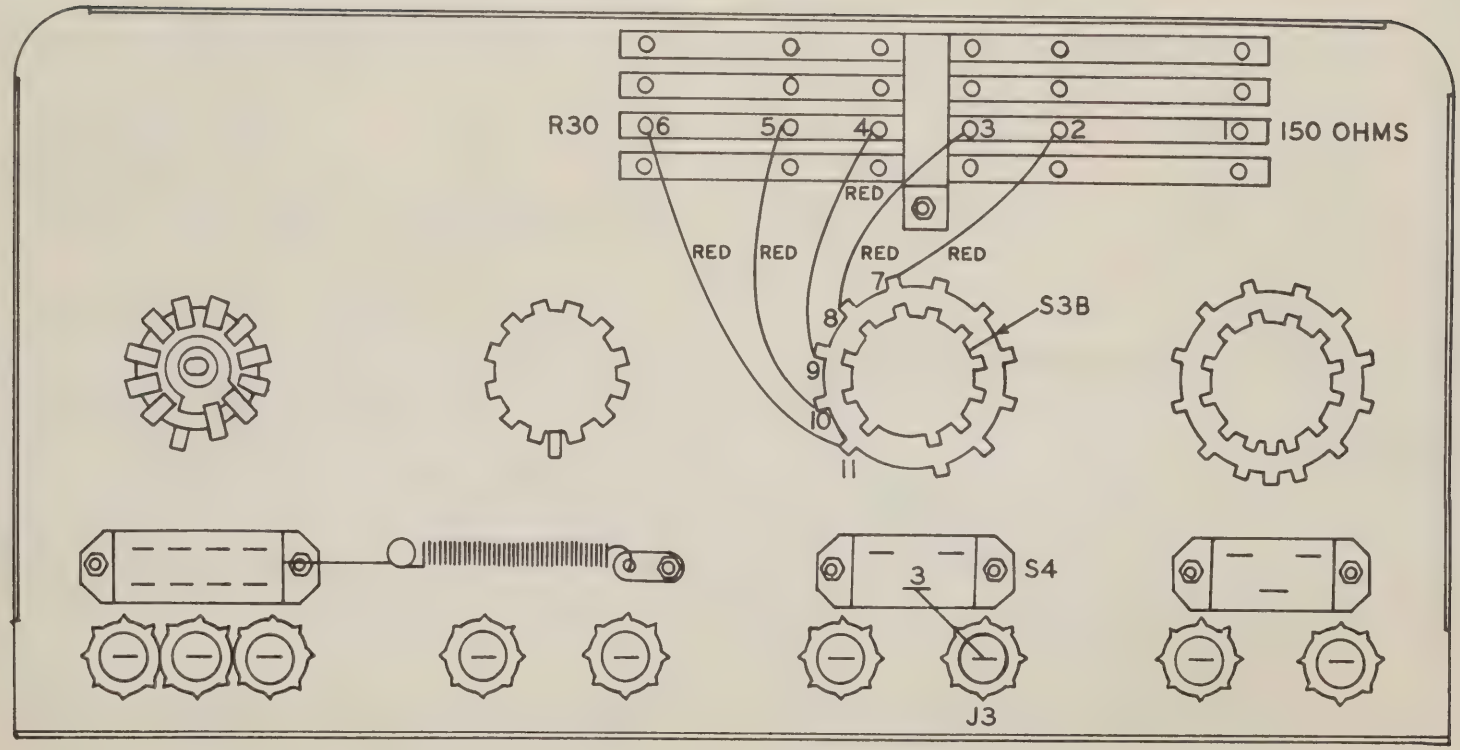
* Not found in all receivers.

FIG. 5
Wiring of 15 ohm Power Resistor



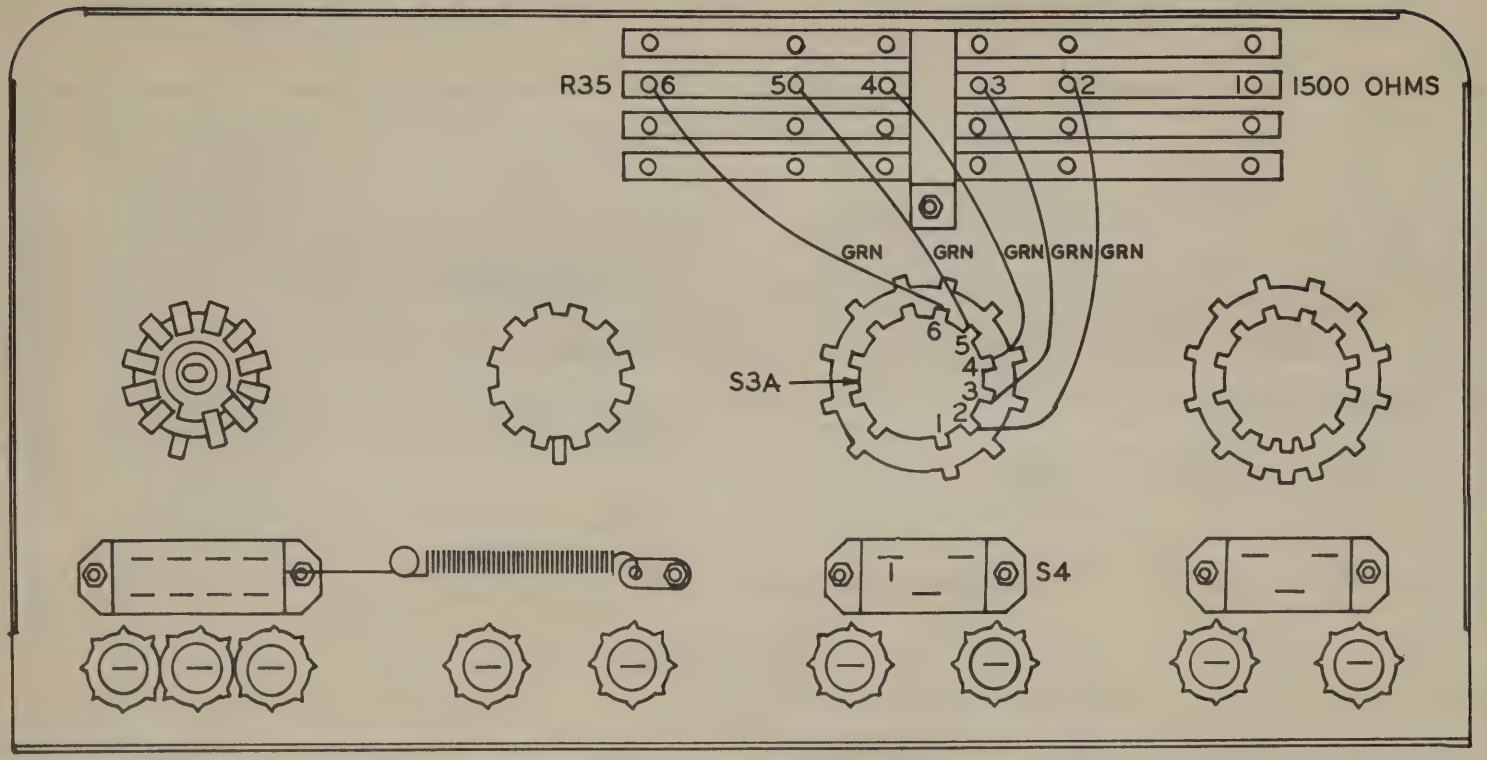
✓	REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
		4″ lg red wire	S3B-2	R25-2	S3B-2, R25-2
		3½″ lg red wire	S3B-3	R25-3	S3B-3, R25-3
		3½″ lg red wire	S3B-4	R25-4	S3B-4, R25-4
		3½″ lg red wire	S3B-5	R25-5	S3B-5, R25-5
		3½″ lg red wire	S3B-6	R25-6	S3B-6, R25-6
		1⅛″ bare wire	S3B-1	S4-2	S3B-1, S4-2

FIG. 6
Wiring of 150 ohm Power Resistor



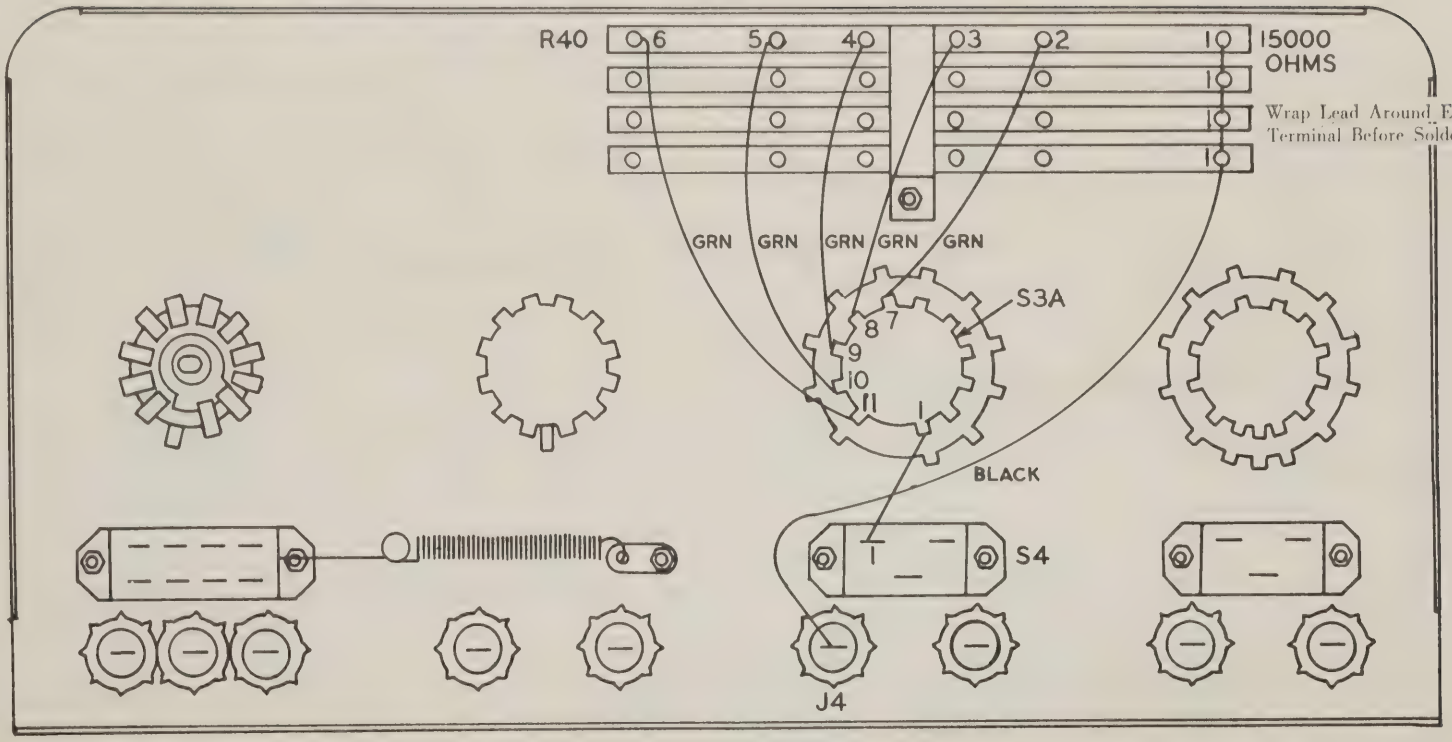
REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
	3½″ lg red wire	S3B-7	R30-2	S3B-7, R30-2
	3½″ lg red wire	S3B-8	R30-3	S3B-8, R30-3
	3½″ lg red wire	S3B-9	R30-4	S3B-9, R30-4
	3½″ lg red wire	S3B-10,	R30-5	S3B-19, R30-5
	4″ lg red wire	S3B-11	R30-6	S3B-11, R30-6
	1⅛″ lg bare wire	S4-3	J3	S4-3, J3

FIG. 7
Wiring of 1500 ohm Power Resistor



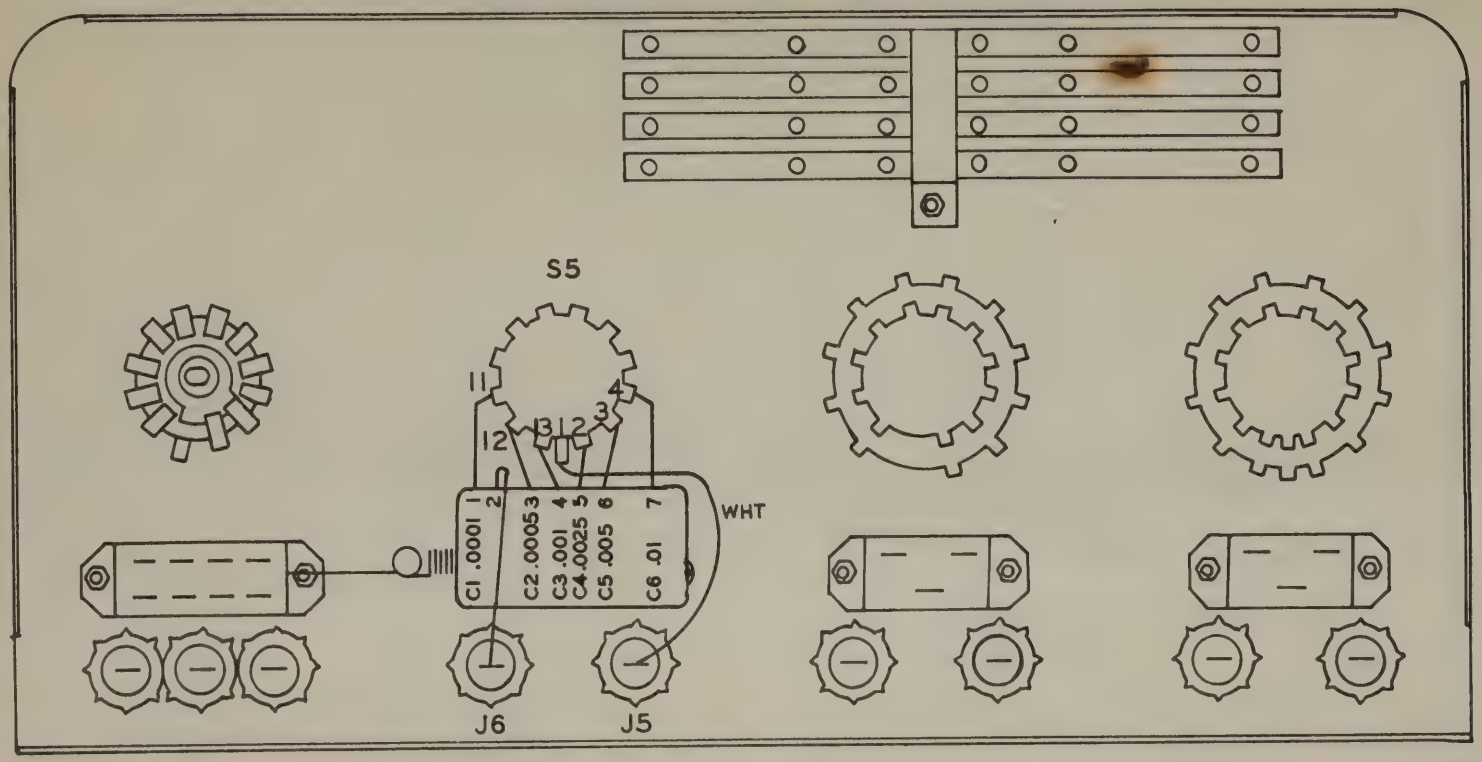
REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
	4" Grn Wire	S3A-2	R35-2	S3A-2, R35-2
	3½" Grn Wire	S3A-3	R35-3	S3A-3, R35-3
	3½" Grn Wire	S3A-4	R35-4	S3A-4, R35-4
	3½" Grn Wire	S3A-5	R35-5	S3A-5, R35-5
	3½" Grn Wire	S3A-6	R35-6	S3A-6, R35-6

FIG. 8
Wiring of 15000 ohm Power Resistor



✓	REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
		1⅛" lg bare wire	S3A-1	S4-1	S3A-1, S4-1
		3½" lg grn wire	S3A-7	R40-2	S3A-7, R40-2
		3½" lg grn wire	S3A-8	R40-3	S3A-8, R40-3
		3½" lg grn wire	S3A-9	R40-4	S3A-9, R40-4
		3½" lg grn wire	S3A-10	R40-5	S3A-10, R40-5
		4" lg grn wire	S3A-11	R40-6	S3A-11, R40-6
		8" lg blk wire	J4	R40-1 R35-1 R30-1 R25-1	J4, R40-1

FIG. 9
Wiring of First 6 Positions of Capacitor-Rectifier Switch

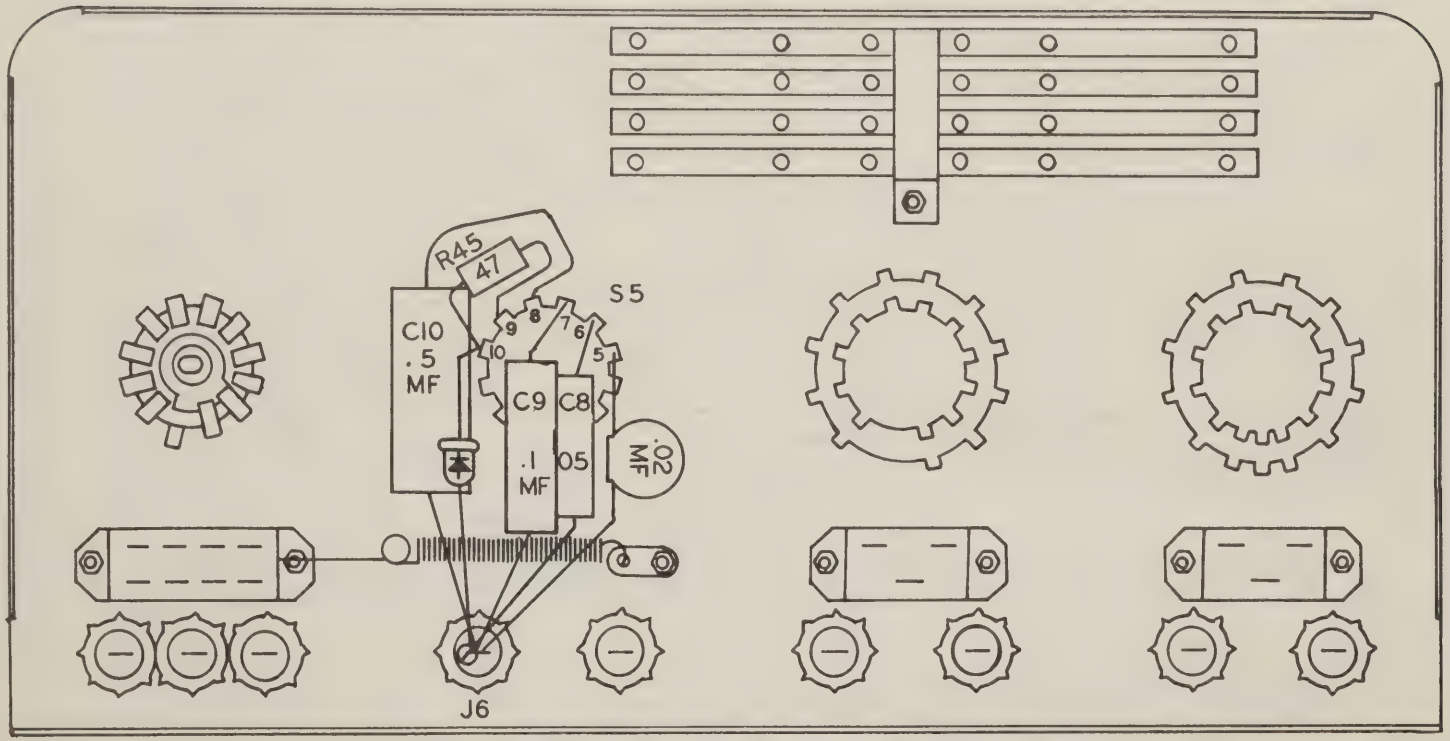


Capacitors C1 to C6 are incorporated in a flat, single multiple capacitor which has the numerals one to seven printed on it. The reference column below pertains to the schematic reference while the "from" column will contain the numeral printed on the capacitor itself. Cut capacitor heads for the shortest length to S5.

REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
C1	.0001 cap	1	S5-11	S5-11
	Cap bare lead from No. 2	2	J6	No
C2	.0005 cap	3	S5-12	S5-12
C3	.001	4	S5-13	S5-13
C4	.0025 cap	5	S5-2	S5-2
C5	.005 cap	6	S5-3	S5-3
C6	.01 cap	7	S5-4	S5-4
	2¾" lg wht wire	J5	S5-1	J5, S5-1

NOTE: Do not rest capacitor board on surge protector spring. It is possible for the spring to wear through the insulation.

FIG. 10
Wiring of Last 6 Positions of Capacitor-Rectifier Switch



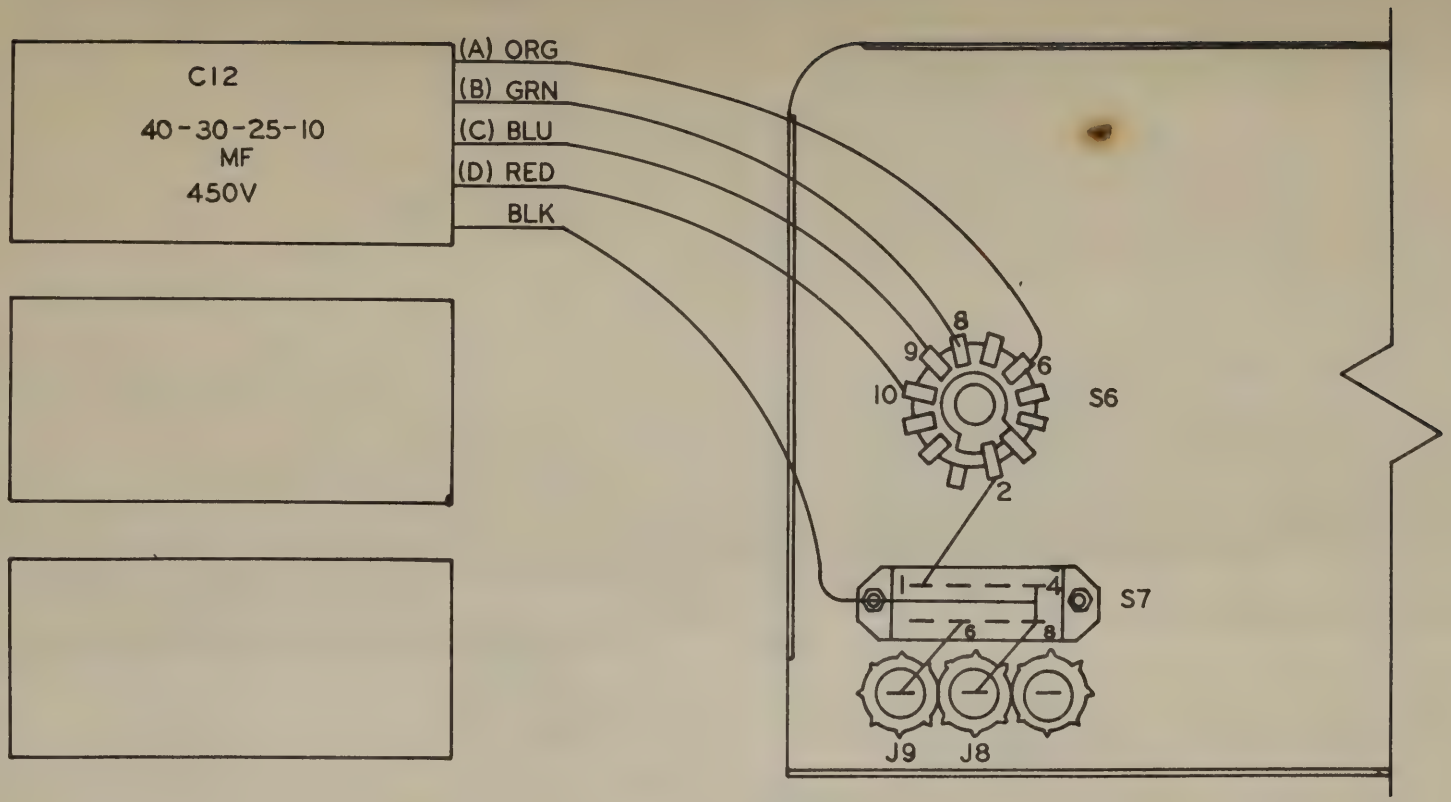
REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
C7	.02 MF +80 —20 Disc. cap	S5-5	J6	S5-5 only
C10	.5 MF cap	S5-8	J6	S5-8 only

NOTE: Since all the capacitors will not fit through the black jacks terminal, it is a good idea to use the lead of capacitor C10 (.5mf) as a ground bus. Insert the lead through the jack terminal, make a loop and connect the remainder of the capacitors to the loop.

C9	.1 MF CAP	S5-7	J6	S5-7 only
C8	.05 MF CAP	S5-6	J6	S5-6 only
R45	47 ohm 5W Resistor	S5-9	S5-10	S5-9 only
CR1	Rectifier .5A 800P1V	S5-10	J6	S5-10, J6

FIG. 11

Wiring of Electrolytic Capacitor C12



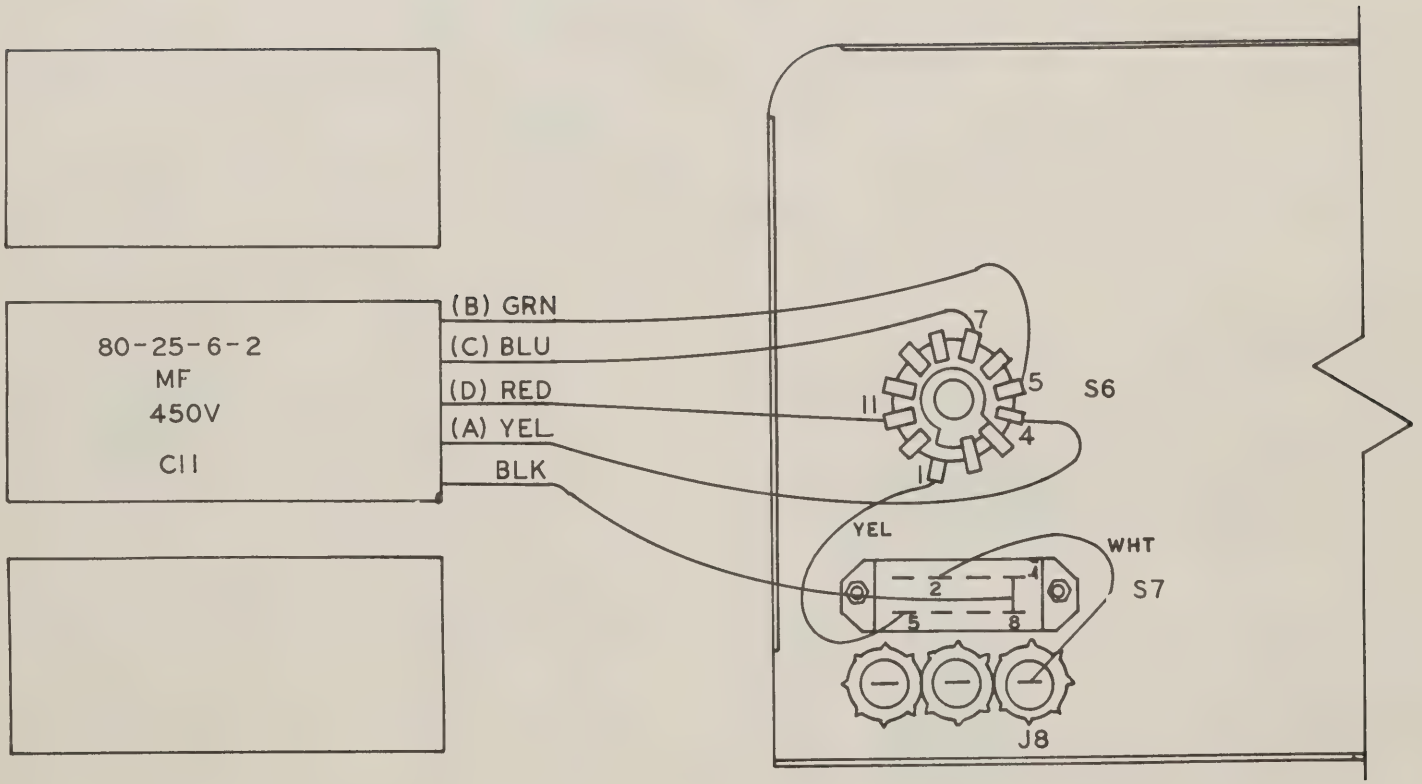
REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
C12-A	Electrolytic Org lead	A	S6-6	S6-6
C-12B	Electrolytic Grn lead	B	S6-8	S6-8
C12-C	Electrolytic Blu lead	C	S6-9	S6-9
C12-D	Electrolytic Red lead	D	S6-10	S6-10
	1⅜" bare lead	J8	S7-4 S7-8	J8, S7-4 S7-8

NOTE: The bare wire between terminals S7-4 and S7-8 is intended to be used as a bus for the common (black) leads of electrolytics C11, C12 and C13. For ease of connection, the black lead should be connected to this wire rather than the switch terminal.

C12	Electrolytic Blk lead	C12	Between S7-4 and S7-8		No
	1⅛" Bare Wire		S6-2	S7-1	S6-2, S7-1
	1⅛" Bare Wire		J9	S7-6	J9, S7-6

FIG. 12

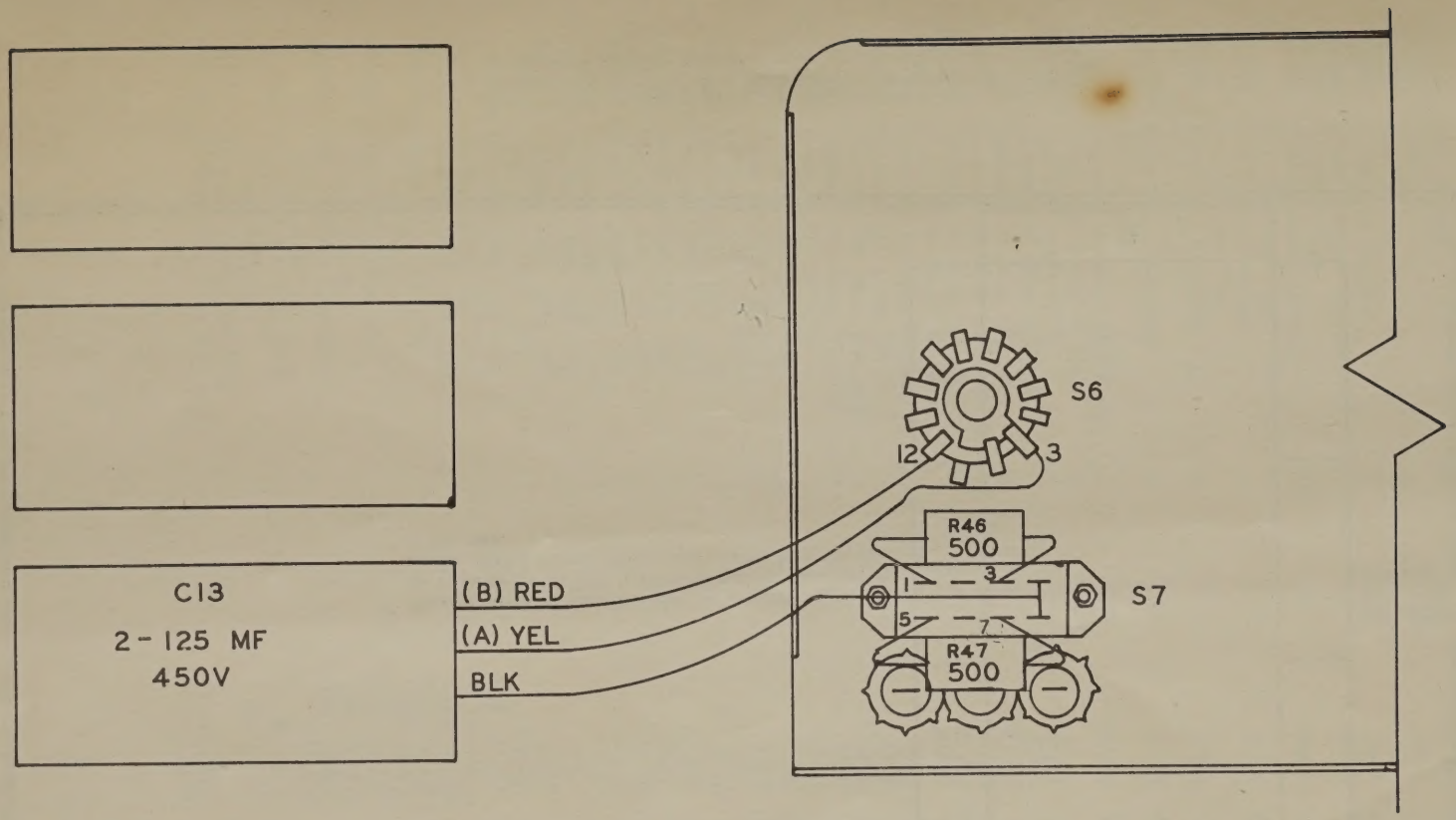
Wiring of Electrolytic Capacitor C11



REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
C11-A	Electrolytic Yel lead	A	S6-4	S6-4
C11-B	Electrolytic Grn lead	B	S6-5	S6-5
C11-C	Electrolytic Blu lead	C	S6-7	S6-7
C11-D	Electrolytic Red lead	D	S6-11	S6-11
	2¾" lg yel wire	S7-5	S6-1	S6-1
	2¾" lg wht wire	S7-2	J7	S7-2, J7
C11	Electrolytic Blk wire	C11	Between S7-4 and S7-8	No

FIG. 13

Wiring of Electrolytic Capacitor C13



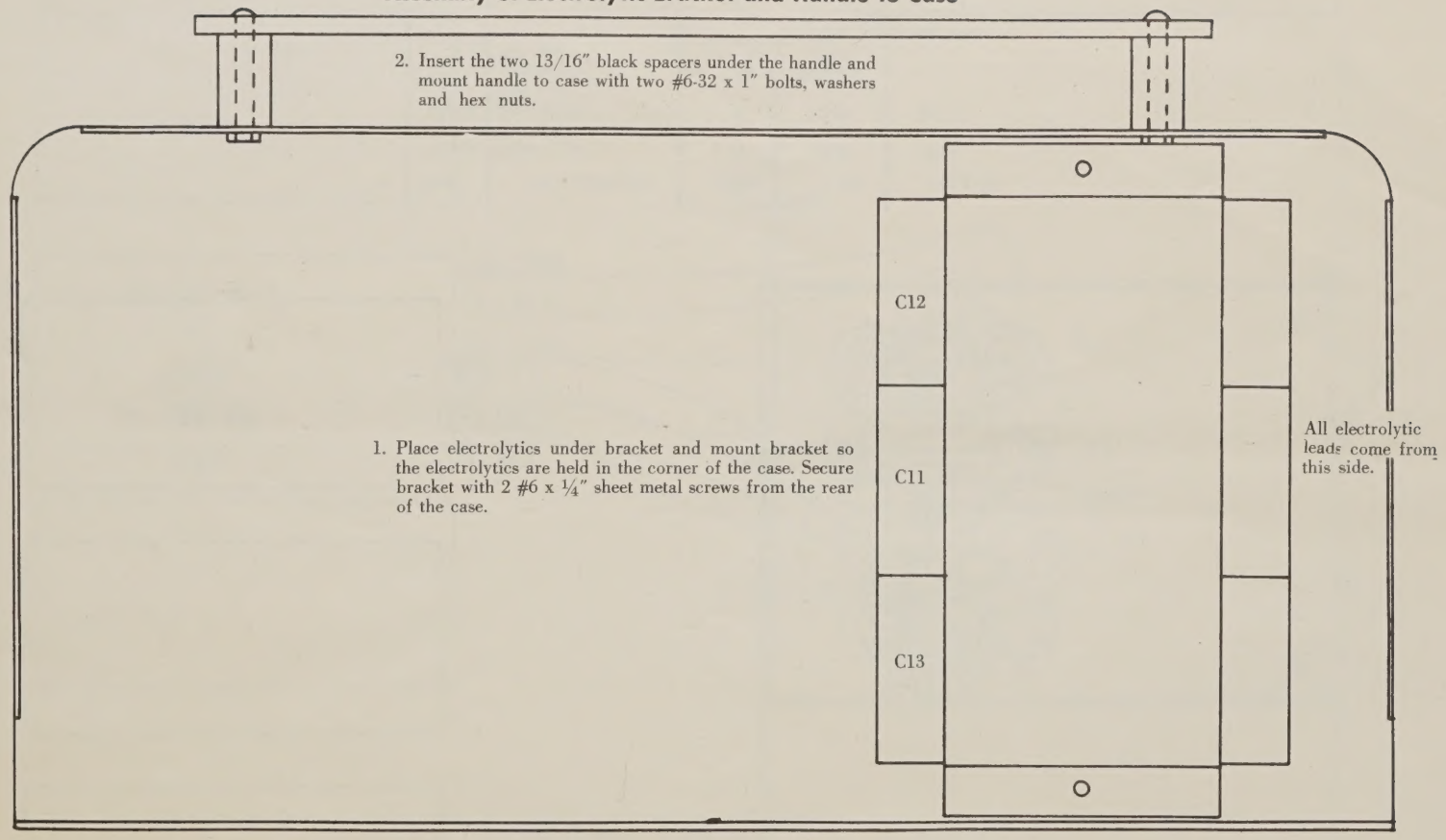
REF	DESCRIPTION	CONNECT FROM	CONNECT TO	SOLDER
C13-A	Electrolytic Yel lead	A	S6-3	S6-3
C13-B	Electrolytic Red lead	B	S6-12	S6-12
C13	Electrolytic Blk lead	C13	Between S7-4 S7-8	3 blk leads on bus
R46	500 ohm 5w Resistor	S7-5	S7-7	S7-5, S7-7
R47	500 ohm 5w Resistor	S7-1	S7-3	S7-1, S7-3

Special notes:

(A) Should the builders desire to cross reference electrolytic capacity to wire color, refer to the imprinted markings on electrolytic housings.

(B) On switch "S7", terminals 1 through 4 are for the "A" section and terminals 5 through 8 are for the "B" section of the electrolytics.

FIG. 14
Assembly of Electrolytic Bracket and Handle to Case


2. Insert the two 13/16" black spacers under the handle and mount handle to case with two #6-32 x 1" bolts, washers and hex nuts.
1. Place electrolytics under bracket and mount bracket so the electrolytics are held in the corner of the case. Secure bracket with 2 #6 x ¼" sheet metal screws from the rear of the case.
C12
C11
C13
All electrolytic leads come from this side.

Install screws on side of panel first before securing bottom of panel. Use #6 x ¼" sheet metal screws. The bottom lip of the panel should be *outside* the case.

PARTS LIST

Ref.	Part No.	Description	Qty.
	10S76	Panel	1
	10S77	Case	1
	10S81	Electrolytic Bracket	1
	10S82	Power Resistor Bracket	1
	11G2	Alligator Clips	4
	12G3B	Black Plastic Insulator For Alligator Clips	2
	12G3R	Red Plastic Insulator For Alligator Clips	2
	12G13	Dark Gray Fishpaper 4⅝" x 1-11/16"	1
	12G14	Dark Gray Fishpaper 4⅝" x ¾"	3
	12G16	Rubber Channel 1-15/16" lg.	1
	13G5B	Black Test Leads 45" lg.	2
	13G5R	Red Test Leads 45" lg.	2
	14G8	Resistor, 47 Ohm ½W 10%	
R1	14G23	Resistor, 10 Ohm 1W 10%	1
R2	14G24	Resistor, 18 Ohm 1W 10%	1
R3	14G25	Resistor, 33 Ohm 1W 10%	1
R4	14G26	Resistor, 56 Ohm 1W 10%	1
R5	14G27	Resistor, 100 Ohm 1W 10%	
R6	14G28	Resistor, 180 Ohm 1W 10%	1
R7	14G29	Resistor, 330 Ohm 1W 10%	1
R8	14G30	Resistor, 560 Ohm 1W 10%	1
R9	14G60	Resistor, 1K 1W 10%	1
R10	14G61	Resistor, 1.8K 1W 10%	1
R11	14G62	Resistor, 3.3K 1W 10%	1
R12	14G32	Resistor, 5.6K 1W 10%	1
R13	14G34	Resistor, 10K ½W 10%	1
R14	14G35	Resistor, 18K ½W 10%	1
R15	14G36	Resistor, 33K ½W 10%	1
R16	14G38	Resistor, 50K ½W 10%	1
R17	14G39	Resistor, 100K ½W 10%	1
R18	14G40	Resistor, 180K ½W 10%	1
R19	14G20	Resistor 330K ½W 10%	1
R20	14G21	Resistor 560K ½W 10%	1
R21	14G59	Resistor 1M ½W 10%	1
R22	14G63	Resistor 1.8M ½W 10%	1
R23	14G64	Resistor 3.3M ½W 10%	1
R24	14G44	Resistor 5.6M ½W 10%	1
R25-R29	14S91	(Bank) 15 Ohm 10W Power Resistor	1
R30-R34	14S92	(Bank) 150 Ohm 10W Power Resistor	1
R35-R39	14S93	(Bank) 1500 Ohm 10W Power Resistor	1
R40-R44	14S94	(Bank) 15,000 Ohm 10W Power Resistor	1
R45	14G8	Resistor 47 Ohm 5W 10%	1
R46-R47	14G149	Resistor 500 Ohm 5W 10%	2

Ref.	Part No.	Description	Qty.
C1-C6	24S2	Capacitor, .0001, .0005, .001, .0025, .005, .01 MF	1
C7	24G3	Capacitor, Disc. .02 MF 600V	1
C8	24G4	Capacitor, Tubulor .05MF @ 600V	1
C9	24G5	Capacitor, Tubulor .1MF @ 600V	1
C10	24G6	Capacitor, Tubulor .5MF @ 600V	1
C11	24S44	Capacitor, electrolytic 80-25-6-2MF @ 450V	1
C12	24S45	Capacitor, Electrolytic 40-30-25-10 MF @ 450V	1
C13	24S46	Capacitor, Electrolytic 125-2MF @ 450V	1
S1	25G51	Switch, Rotary 2P12P	1
S2, S4	25G4	Switch, Slide SPDT	2
S3	25G52	Switch, Rotary 2P10P	1
S5	25G53	Switch, Rotary 1P12P	1
S6	25G54	Switch, Rotary 2P10P	1
S7	25G55	Switch, Slide 2P3P	1
CR1	16G7	Rectifier, 500MA 800 PIV	1
	21G6	Knobs, Block Circular	4
	22G7	Handle, Chrome Plated	1
	29G2	Washer, Steel #6 Int. Tooth	3
	29G5	Washer, Rotary Switch	4
	31G1	Nut Hex, Rotary Switch	4
	31G3	Nut, Hex, #6-32 x ¼"	3
	30G1	Screw, #6 x¼" Sheet Metal	6
	30G2	#6—32 x ¼ Phillips	1
	30G7	Screw, #6-32 x 1" Round Bead	2
	33S47	Spring for S7	1
Pre-	33S48	Spring Lock Assembly	1
Assembled	33S49	#6 Solder Terminal	1
	33G50	Spaces, Black, For Handle	
	35G1	Phone Tips For Test Leads	4
	36G1B	Phone Tip Jack, Black	2
	36G1R	Phone Tip Jack, Red	7
	42W1-11-5-5	Wire, 2¾" lg., White	2
	42Y1-11-5-5	Wire, 2¾" lg., Yellow	1
	4GB1-14-5-5	Wire, 3½" lg., Black	1
	42R1-16-5-5	Wire, 3½" lg., Red	8
	42G1-14-5-5	Wire, 3½" lg., Green	8
	42R1-1615-5	Wire, 4" lg., Red	2
	42G1-16-5-5	Wire, 4" lg., Green	2
	42B1-32-5-8	Wire, 8" lg, Black	1
	42BA1-5	Wire, 1⅛" lg., Bare	8
	42BA1-6	Wire, 1⅜" lg., Bare	1
	42BA2-15	Wire, 1-13/16" lg., Bare Circular	1
	Form #184	Introduction Sheet	1
	Form #179	Instruction Manual	1

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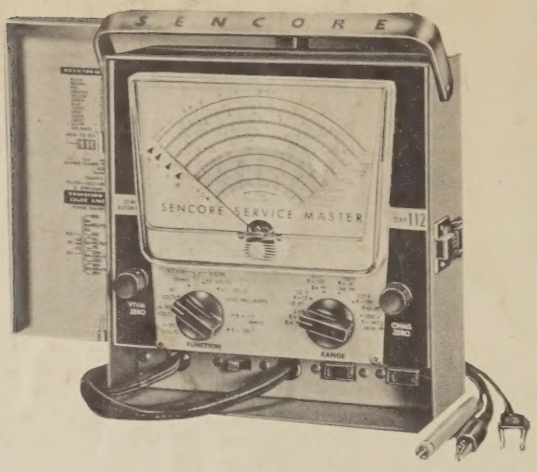

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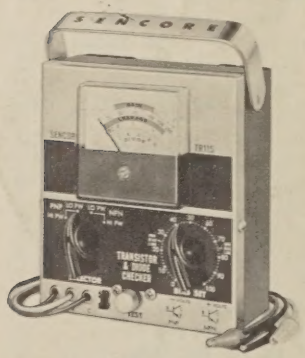

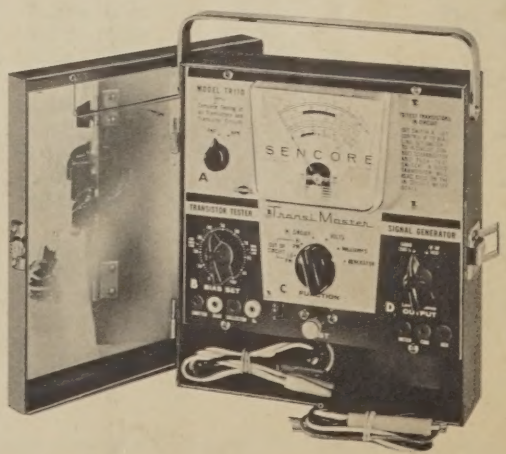

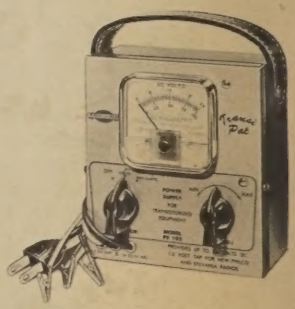

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